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### **Image analysis and probabilistic robotics**

In image analysis, we are often dealing with a large amount of uncertainty. One way to handle uncertainty is to take care that images are recorded in a standard way with good contrast between object and background. However, in many applications we want to handle complex images with high uncertainty.

In robotics for example, decisions often have to be taken by a robot based on information extracted from complex scenes and a probabilistic framework is then needed to handle these uncertainties. This is often referred to as ‘probabilistic robotics’ and includes approaches like particle filters and (partially observable) Markov decision processes.

In this talk, I want to show two vision-based robot applications, one for autonomous navigation and one for weed detection. In the first application a robot has to navigate autonomously in a field of maize between rows of plants. In the second application we will try to detect weed plants in grassland, using Fourier methods in a particle filter context.

This is joint work with Frits van Evert and Santosh Hiremath (Wageningen UR) and Arjen Lamaker (MARIN)

**Dr van der Heijden** is a senior scientist at Biometris, the group of mathematicians and statisticians of Wageningen UR in the Netherlands. His research is focused on the application of image analysis in life sciences. He has been studying digital shape analysis and spectroscopic imaging for different applications, including plant variety testing, plant sorting and microscopy research. Current research interests include probabilistic robotics and feature extraction in complex environments for applications as large scale phenotyping of plants, virus detection in tulips and autonomous field robots.